

Improvements in and relating to a broadcast network

5 The present invention relates to delivery of content over a broadcast network and in particular to a broadband digital broadcast network.

Background of the invention

10 As is well known, broadband digital broadcast (BDB) networks such as the terrestrial Digital Video Broadcast (DVB-T) network are intended to deliver content in the form of a television broadcast and can also deliver data in a multicast/unicast. The delivery of data and indeed any other service as a multicast or unicast requires the presence of some form of conditional access to ensure the content reaches the correct terminal. Furthermore, to provide  
15 interactivity it is necessary to provide a return channel linking a terminal to the network. In this way, a request for content can be communicated to the network which may subsequently deliver the content to the terminal.

20 It has thus been the case that content has been delivered either at the request of the receiving terminal or at the instigation of the network. In the latter case, the network might receive a request from an external content provider to deliver content in the form of an advertisement or the like over the network. Such a request might lead to the content being broadcast, multicast, or even unicast. However, the decision for a content provider as to how and  
25 when to request the delivery of content is hampered by the unidirectional nature of the network.

Summary of the invention

30 Thus, according to one aspect of the invention, there is provided a controller connectable to first and second wireless networks, the controller including a

processor operable to initiate delivery of content by said first network in response to a criterion being met by data derived from said second network.

The invention is particular applicable to content delivery by those networks which either do not have or only posses limited return channel capability. Such networks are not suited to the delivery of targeted content such as, for example, advertising. The invention provides the content provider with the advantage of being able to target the delivery of content much more effectively. Preferably, the second network will be selected to the extent that it can provided data advantageous for targeting delivery of content by the first network. Thus, the second network may be a public land mobile network such as a GSM based network, for example. In which case, data relating to the user activity in the network, such as might be stored in a GSM Home Location Register (HLR) may be provided to the first network, which could be a broadband digital broadcast network exemplified by a Digital Video Broadcast (DVB) network. Advantageously, the data derived from the second network will allow the content provider to tailor content to suit the desired audience. Thus an advertiser will be able to develop content to suit a particular market opportunities.

Preferably, the criterion is established as a function of at least one indicia representative of user activity in said second network. One criterion may be when the data derived from said second network exceeds a predetermined threshold value. Conveniently, more than one indicia may be utilised in generating a criterion for the delivery of content. Advantageously, the selection of an indicia allows a content provider to make an assessment of the intended audience of the content to be delivered. Thus, a geographical indicia might be appropriate where the content relates to a particular location such as the provision of services in an area for example hotel rooms. In which case a level of user activity could be monitored in that area which, when exceeded would trigger the delivery of content. Another example of a geographical indicia could be a concentration of user activity at a particular

venue such as a conference centre or sport stadium. The content provider could then arrange delivery of content appropriate to that venue once a certain threshold of user activity had been reached. An alternative indicia could be an identification of user activity amongst a certain population of users identified to the second network. Such an indicia might rely on profiling by the network, revealing data such as grouping users by the length of time they are active in making use of the network or those whose pattern of use takes them to well defined locations such as airports for example on a regular basis.

Further advantages of the invention stem from the fact that because delivery of content may be initiated or controlled to occur under certain specific conditions, it is possible for the network provider to levy corresponding charges for the delivery of content. This ability is reinforced by the fact that the network operator can clearly identify to a potential content provider the audience available or even more usefully identify a potential audience in advance to which content could be delivered.

The data derived from the second network may comprise a number of connected user terminals to said second network. The first wireless network may be a unidirectional digital broadband network, such as, a Digital Video Broadcast (DVB) network, and the second wireless network may be a bi-directional communications network,

According to a further aspect of the invention, there is provided a content delivery system comprising first and second wireless networks and a controller connected thereto, the controller including a processor operable to initiate delivery of content by said first network in response to a criterion being met by data derived from said second network.

Although the controller might be physically integrated with either the first or second networks, it could be provided as a separate entity in which case the

5

10

15

25

30

According to a still further aspect of the invention, there is provided a content delivery system, comprising;

a wireless unidirectional digital broadband network;

a wireless bi-directional communications network; and

5 a controller connected to both networks, the controller comprising:

a processor;

a storage device; and

software means operative on the processor for:

maintaining in the storage device a database including threshold values

10 associated with content corresponding to user activity;

monitoring user activity in a wireless bi-directional communications network;

and delivering the content to a terminal connected to a wireless unidirectional digital broadband network when the user activity exceeds the corresponding threshold value.

15

According to a still further aspect of the invention, there is provided A content delivery method comprising monitoring user activity in a wireless bi-directional communications network within an area and delivering content to a user terminal of a wireless unidirectional digital broadband network when a number of connected user terminals to the wireless bi-directional communications network within said area exceeds a predetermined threshold value.

20

#### Brief Description of the Drawings

25 In order to aid in understanding the present invention, a particular embodiment thereof will now be described by way of example and with reference to the accompanying drawings, in which:

Figure 1 is a diagrammatic view of a prior art Public Land Mobile Network (PLMN) topology;

30

Figure 2 is schematic view of a content delivery system according to one aspect of the present invention; and

Figure 3 is a flowchart illustrating a method for use with the system of Figure 2.

Detailed description of the invention

5

Referring to Figure 1, there is shown a typical cellular topology of a public land mobile network (PLMN) 1 covering a region. As is well known to those skilled in the art, the PLMN 1 remains informed of a cell in which a mobile station (MS) is located. Typically, an MS periodically contacts the PLMN 1 and the PLMN 1 stores location information in a database known in the GSM case, at least, as a Home Location Register (HLR) 3. Depending on the particular PLMN 1, the location information stored in the HLR 3 may indicate at best a particular cell in which a MS is located or alternatively, a group of cells. Again depending on the particular PLMN, the HLR 3 will obtain periodic updates of the MS location. The information held in the HLR relating to a MS is, of course, required to enable connection of a call to a MS.

10

15

20

Within the region covered by the PLMN 1, there are a number of cells in which concentrations of MS may, from time to time occur. Thus in Cell C there is located a conference centre, in Cell G an airport and in Cell H a motorway junction. Clearly, any increase in the number of MS in these or indeed any other cell in the PLMN 1 will be represented in the information stored in the HLR 3.

25

30

Turning now to Figure 2, this illustrates a content delivery system 5 including a terrestrial broadband digital broadcast (BDB) network 7 namely a digital video broadcast (DVB-T) network. A user equipped with a suitable terminal 9 incorporating a receiver (not shown), display 11 and user interface (not shown) can receive data broadcast by the BDB network 7 from a transmitter 13. The data broadcast by the transmitter 13 is derived from a variety of sources 15 via a gateway 17 and may include IP and Television content.

Before transmission, the data received from each source is processed in head-end equipment 19. As is well known in the art, the head end equipment 19 places the data into MPEG-based data containers. To cater for the delivery of data to a particular terminal 9 or group of terminals, the containers may also hold address information which can be identified and read by a conditional access component in each terminal 9 to determine whether the data is intended for that terminal 9. The BDB network 7 also provides the facility for suitably equipped terminals 9 to interact with the BDB network 7. By suitably equipped terminal is meant a terminal 9 having a return channel Rc 21 for providing network interactivity as exemplified in the case of DVB by a number of specifications published by the Digital Video Broadcasting Office and also the European Telecommunications Standards Institute (ETSI) including the following: DVB-NIP Network Independent Protocols for DVB Interactive Services ETS 300 802 (V1: 11/97), Guidelines for the use of the Network Independent Protocols for DVB Interactive Services TR 101 194 (V1.1.1: 06/97), DVB-RCP DVB interaction channel through the Public Switched Telecommunications System (PSTN) / Integrated Services Digital Network (ISDN) ETS 300 801 (V1: 08/97), DVB-RCG Interaction channel through the Global System for Mobile communications (GSM) EN 301 195 (V1.1.1 : 02/99).

Thus, a user may request the delivery of a computer file by the BDB network 7 to her terminal 9. As has been indicated above, such interactive functionality requires a return channel 21 from the terminal 9 to the DVB-T network 7 and a conditional access component in the terminal 9. The modem functionality is conveniently provided by a mobile station 3 connected to the PLMN 1, the main features of which are well known to those skilled in the art. To provide a return channel 21 from the terminal 9 to the BDB network 7, a connection is provided between the PLMN 1 and a subscriber management system (SMS) 23 of the BDB network 7. The MS 3 may be a separate entity in which case it could be interfaced to the Terminal 9 over a Low Power Radio

As has been previously mentioned, the SMS 23 already has connections to the gateway 17 and the transmitter head-end equipment 19. It is thus possible for the user to issue requests for specific content via the user interface of the terminal 9 and thus through the MS 9 connected to the PLMN 1. The request is received by the SMS 23 which obtains the content from the gateway 17 and passes it to the head-end 19 for placing into data containers for onward transmission. It should be noted that the request from the user might include content which is not presently being transmitted by the BDB network 7. To ensure that the user only receives the requested content, the data is broadcast with an identifier which the conditional access component in the terminal 9 recognises as being intended for delivery to the user. In the event that the content is received by another terminal 9, the conditional access component of that terminal 9 will prevent delivery of the content.

000000707TA VWJ 07'0T TA TT/07



number of active MS present and the number of active terminals, although not necessarily belonging to the same users. However, at a motorway junction although the number of MS present may be quite high, the number of active terminals present may be much lower than that in the previous example as those terminals that are present may be switched off for safety reasons. Such estimates may be based on a statistical analysis of the likely type of MS user present at a particular source and his likely pattern of terminal use in such circumstances. Alternatively or additionally, the estimate could be built up through observation of the activity patterns of groups of users of the PLMN 1.

Thus, as has been said, at a sporting event, or on the motorway, the ratio may be low whereas in an airport or at a conference centre the ratio could be much higher. The information or profile determined by the controller 27 is then utilised through providing opportunities to content providers to deliver content to users in those hot spots. The controller 27 will also be able to establish a cost for delivering the content based on the demand on bandwidth and the like.

The controller 27 further provides monitoring means for establishing a trigger level for demand in a particular location or locations which might be as small as a single group or as large as substantial portion or portions of the network. for example

In a further refinement of the above embodiment, the controller is given access to personal profiles of the users of MS and/or Terminals in the PLMN and BDB networks respectively. Thus, the identity of a user or group of users in a hot-spot could first be established from the information in the HLR 3 and the controller 27 could then provide the additional information contained in the corresponding personal profile(s) to a content provider. The content provider would then be further assisted in the selection of delivery opportunities for relevant content, that is the delivery criterion could be modified, if appropriate.

As will be apparent the profile established by the controller 27 allows careful tailoring of the delivery of content to a group of terminals 9. It will further be appreciated that rather than set a single criterion or threshold in the controller 27 to determine locations having high demand, a set of different thresholds  
5 may be set having differing levels of demand thus giving the controller 27 operator the opportunity to provide a more accurate profile to potential content providers together with a correspondingly banded pricing structure.

One example of how an embodiment of the invention might be employed in  
10 delivering content to a terminal or terminals is set out below and illustrated in the flowchart of Figure 3..

An advertiser might receive instructions from a client to promote services or goods. For example, a hotel chain may have a large number of rooms  
15 available in proximity to the conference centre. The advertiser will, through negotiation with a service provider establish content 30 suitable for promoting the hotel chain. This information could be tailored to suit different localities where rooms were available perhaps by including local tourist information. The service provider will then, on the instructions of the advertiser establish a  
20 criterion or trigger level 40 at which the content would be provided both by reference to locality and user profile. This information would be provided to the BDB network operator who would program the controller 27 with the appropriate information. Subsequently, should the trigger be met 50 by user activity in the PLMN network 1 then the delivery 60 of content from the  
25 service provider in the format agreed by the advertiser would take place.

Further embodiments of invention are described below:

A controller may be connectable to a wireless unidirectional digital broadband  
30 network and to a wireless bi-directional communications network. The controller includes a processor operable to initiate delivery of content via the wireless unidirectional digital broadband network to a determined area. This

00000070710 VMI 07:07 TO XX (25)

- 10  
15  
20  
25  
30

One more embodiment relates to a content delivery method. The method comprises monitoring user activity in a wireless bi-directional communications network within an area and delivering content to a user terminal of a wireless unidirectional digital broadband network when a number of connected user terminals to the wireless bi-directional communications network within said area exceeds a predetermined threshold value.

- 25 It should be noted that although in the foregoing embodiment the terminal 9 is  
described as being interfaced to a MS 3 in order to provide a return channel  
21, the presence of such an interface or indeed a return channel 21 is not  
necessary for the performance of the invention. Those skilled in the art will  
recognise that the only necessity is that there exists a population of users in  
30 one network whose activities can be correlated with the presence of terminals  
for delivery of content by another network.